

protection to contacts **1622a**, **1624a**, **1625a**, **1626a** and housing **1805** such that water and debris may not penetrate the self-healing elastomer. In further embodiments, self-healing elastomer **1815** may provide a barrier against water vapor and in further embodiments may provide a hermetic seal (i.e., impervious to gasses). Self-healing elastomer may be bonded to housing **1805** and may have flush or tapered edges as discussed above. In other embodiments, self-healing elastomer **1815** may be filled with one or more pigments to obscure contacts **1622a**, **1624a**, **1625a**, **1626a** and opening **1810** as also discussed above.

**[0078]** As further illustrated, one or more conductively doped regions **1820** may be disposed over each of contacts **1622a**, **1624a**, **1625a**, **1626a**. Thus, when conductive sleeves **1416**, **1526** and conductive rings **1414**, **1524**, **1525** of audio connectors **1410** and **1520** (see FIGS. **14** and **15**) come into contact with conductively doped regions **1820**, electrical contact is made between the audio connectors and the circuitry within housing **1805**. In some embodiments an additional layer of self-healing elastomer may be placed over opening **1810**.

**[0079]** In some embodiments self-healing elastomer **1820** may be manufactured as discussed above, and subsequently inserted into cavity **1665** (see FIG. **16**) of connector **1600**. In other embodiments, self-healing elastomer may be molded around contacts **1622a**, **1624a**, **1625a**, **1626a** and installed as an assembly into housing **1605**, **1610** (see FIG. **16**). Other methods may be used to manufacture the embodiment illustrated in FIG. **18** without departing from the invention.

**[0080]** FIG. **19** illustrates another embodiment showing a cross-sectional view of audio connector **1600** (see FIG. **16**) installed within housing **1905** of an electronic device such as device **100** in FIG. **2**. Similar to the embodiment described in FIG. **18**, a self-healing elastomer **1915** having conductively doped regions **1920** is disposed inside of audio connector **1600**. However, in this embodiment substantially the entire cavity **1665** (see FIG. **16**) of connector **1600** is filled with self-healing elastomer **1915**. Contacts **1622a**, **1624a**, **1625a**, **1626a** are accessible through opening **1910** in housing **1905**. Layers of self-healing elastomer **1915** are disposed in a cylindrical shape in the interior of audio connector **1600**. Layers of conductively doped regions **1920** are also disposed in cylindrical shapes in the interior of audio connector **1600**. Layers of self-healing elastomer **1915** are disposed between layers of conductively doped regions **1920** to provide electrical isolation.

**[0081]** As further illustrated, one or more conductively doped regions **1920** may be disposed over each of contacts **1622a**, **1624a**, **1625a**, **1626a**. Thus, when conductive sleeves **1416**, **1526** and conductive rings **1414**, **1524**, **1525** of audio connectors **1410** and **1520** (see FIGS. **14** and **15**) come into contact with conductively doped regions **1920**, electrical contact is made between the audio connectors and the circuitry within housing **1905**. In some embodiments an additional layer of self-healing elastomer may be placed over opening **1910**.

**[0082]** Displacement ports **1925** may be disposed within the audio connector housing to provide for displacement of self-healing elastomer **1910** and conductively doped regions **1920** when an audio connector plug (e.g., FIGS. **14** and **15**) is inserted in audio connector **1600**. Upon removal of audio connector plug, self-healing elastomer **1910** and conductively doped regions **1920** may regain at least some of their aesthetic, protective and/or mechanical properties.

**[0083]** As discussed above, self-healing elastomer **1910** may provide a protective barrier for contacts **1622a**, **1624a**, **1625a**, **1626a** and housing **1905**. Self-healing elastomer **1910** may be bonded to housing **1905** and may have flush or tapered edges as discussed above. In other embodiments, self-healing elastomer **1910** may be filled with one or more pigments to obscure contacts **1622a**, **1624a**, **1625a**, **1626a** and opening **1910** as also discussed above.

**[0084]** In some embodiments self-healing elastomer **1920** may be manufactured as discussed above, and subsequently inserted into cavity **1665** (see FIG. **16**) of connector **1600**. In other embodiments, self-healing elastomer **1920** may be molded around contacts **1622a**, **1624a**, **1625a**, **1626a** and installed as an assembly into housing **1605**, **1610** (see FIG. **16**). In further embodiments, layers of self-healing elastomer **1920** may be deposited within cavity **1556** and alternated with layers of conductively doped regions **1920**. Other methods may be used to manufacture the embodiment illustrated in FIG. **19** without departing from the invention.

**[0085]** FIG. **20** depicts a simplified flowchart **2000** illustrating a general method for interfacing with an electronic device equipped with a hidden connector. The particular series of processing steps depicted in FIG. **20** is not intended to be limiting.

**[0086]** As depicted in FIG. **20**, the method may be initiated at **2010** when an electronic device equipped with one or more external connectors requires communication, charging or service using a wired connection. The external connector may have a self-healing elastomer disposed over the connector to improve the device aesthetics and/or to protect the connector and the device from damage.

**[0087]** In some embodiments, such an electronic device may require programming at the manufacturing facility and a wired communication system may be the most tractable method. In other embodiments, such an electronic device may require a wired connection for charging or servicing. More specifically, in some embodiments, an electronic device may be completely wireless (e.g., equipped with wireless communication and charging capabilities) except for a single connector covered by a self-healing elastomer. Thus, in some scenarios the most tractable method to service the device may be through a wired connection, such as, for example, when the internal battery is drained and the wireless communication system is unavailable. In other embodiments an audio system may require a wired connection to the electronic device.

**[0088]** At **2020**, a data or audio connector may be mated with the external connector on the electronic device. The data or audio connector may have one or more probes, each having a relatively pointed tip to effectively penetrate the self-healing elastomer to make contact with the external connector's electrical contacts. In some embodiments the external connector contacts are metallic pads on a substrate while in other embodiments the external connector contacts may be conductively doped regions within the self-healing elastomer. The data or audio plug may be aligned with the external connector using alignment features in the electronic device and/or external fixtures. The probes within the data or audio connector may pierce the self-healing elastomer in a penetration region, temporarily displacing the self-healing elastomer to make an electrical connection with the external connector contacts.

**[0089]** At **2030**, the data or audio connectors are mated with the external connector on the electronic device and the power and/or data transfer occurs. Current may flow through the